

Cloud Computing

Winter Term 2023/2024

Tutorial Session 1



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Distributed and Operating Systems (DOS)

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Organization

- Five tutorial sessions (every third Tuesday 4-6 pm, H 2013):
 - 07.11.
 - 28.11.
 - 19.12. + 09.01.
 - 23.01.
- Each session introduces one assignment
- Each assignment is due 1,5 weeks later (skipping Christmas)
- Written Exam:
 - 1st date: 22.02.2024, 2nd date: 12.04.2024
- Exam counts 50% of the final grade, other 50% via assignments

Organization

- Assignments are solved in teams of 5 student
 - Forming groups was due to October 29, 35:55
- **Important: MOSES Registration**
 - Email me (or Jana Bechstein jana.bechstein@tu-berlin.de) if there are problems
 - Required to submit assignments and write the exam!
 - Deadline: 17.11.2023 23:59:59
 - If not registered after deadline: Removal from ISIS course!

Practical Assignments

- Topics covered
 - Usage of Infrastructure-as-a-service clouds (dashboard and CLI API)
 - Benchmarking the performance of different platforms
 - DevOps tasks for cloud services
 - Infrastructure-as-code orchestration
 - Container virtualization (Docker)
 - Container-based orchestration (Kubernetes)
 - Possibly: FaaS and topics related to carbon-aware computing
- Sources of Information:
 - Assignment sheet
 - Online documentation
 - Online forums (<https://stackoverflow.com/>)
 - ISIS forum: ask your fellow students!

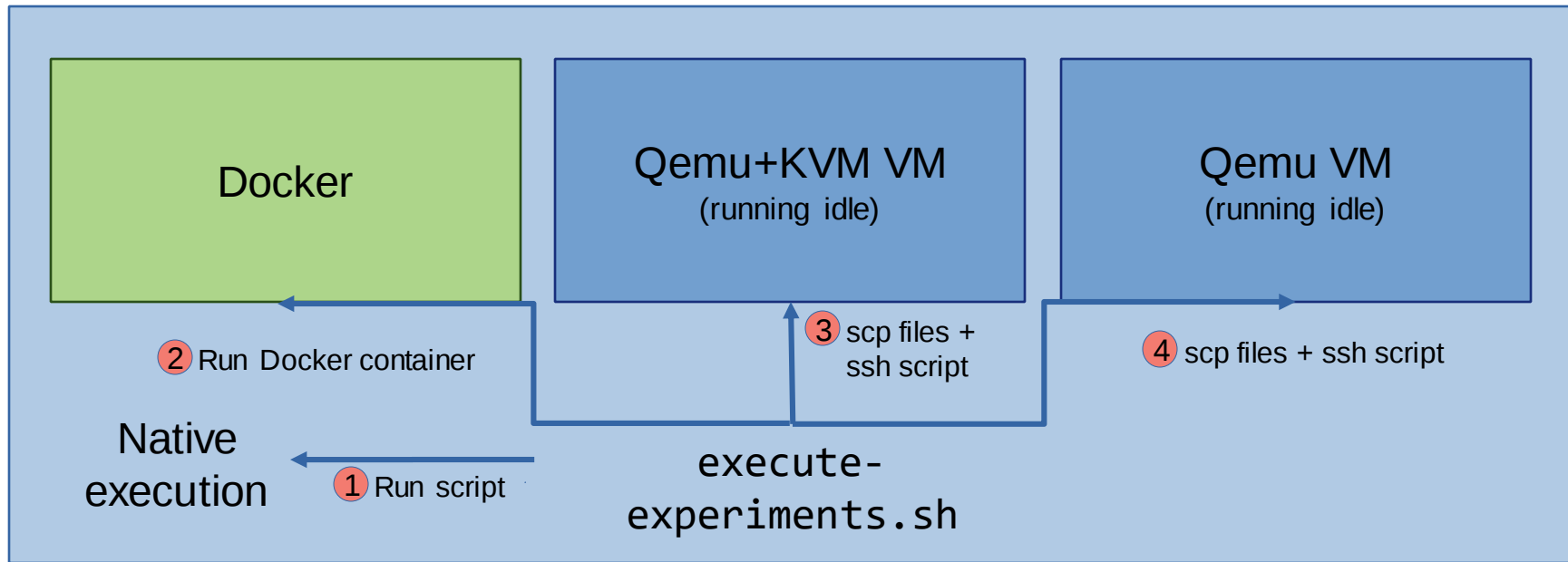
Practical Assignment 1

- Due: 19.11.2023
- Summary:
 - Create account on Google Cloud Platform
 - Receive a coupon for Google Cloud credits (link on assignment sheet)
 - Create and prepare specific VMs on GCP
 - Create and prepare different virtualization technologies on top of the GCP VMs
 - Write performance benchmarks (CPU, disk, memory benchmarks)
 - Benchmark the technologies and machine types regularly and collect the results
 - Plot the results with a script provided by us
 - Answer questions related to your measurements

Practical Assignment 1: Virtualization Platforms

- Native execution
 - Simply execute `./benchmark.sh`
- Docker
 - Write Dockerfile that executes benchmark script
 - The container image must contain all tools and files for all benchmarks, execute the benchmark when started without parameters, and exit after printing the results
- Qemu (with and without KVM)
 - Use an Ubuntu 22.04 cloud image
 - Either work directly with `qemu-system-*` executable, or use a management program such as `libvirt`

Practical Assignment 1: Benchmark Setup



Experiment host: Public Cloud GCP VM

Assignment Submission: ISIS

- Submit all required files on ISIS
- Resubmissions are possible: only the last submission will be counted
- Submission will be partially validated automatically:
 - Use exactly the correct file names
 - Submit exactly the 6 required files described in the assignment
 - Use the text field to enter your answers to the final questions

Assignment Submission: ISIS

CC_WS23/24 / Practical Assignments / Assignment 1



Assignment 1

Assignment 1

Geöffnet: Montag, 30. Oktober 2023, 08:55

Fällig: Sonntag, 19. November 2023, 23:55

Abgabe hinzufügen

Abgabestatus

Gruppe	
Abgabestatus	Für diese Aufgabe wurde nichts abgegeben
Bewertungsstatus	Nicht bewertet
Verbleibende Zeit	Verbleibend: 12 Tage 10 Stunden
Zuletzt geändert	-
Abgabekommentare	

Assignment Submission: ISIS

Assignment 1

Geöffnet: Montag, 30. Oktober 2023, 08:55

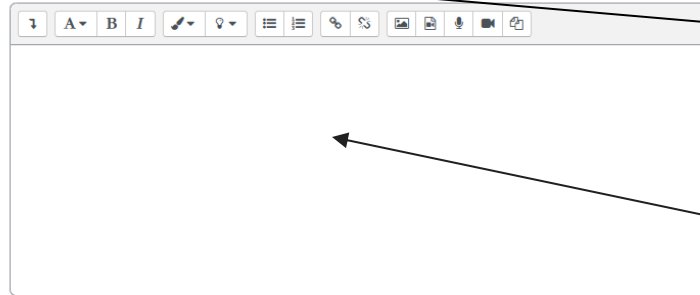
Fällig: Sonntag, 19. November 2023, 23:55

Bitte geben Sie möglichst keine PDF-Dateien ab, die Sie mit Microsoft Edge bearbeitet haben.

▼ Abgabe hinzufügen

☐ Diese Arbeit ist die eigene Leistung meiner Gruppe. Sofern wir fremde Quellen verwendet haben, sind diese Stellen entsprechend gekennzeichnet

Texteingabe online

A text editor interface with a toolbar at the top containing icons for undo, redo, bold, italic, text color, background color, bulleted list, numbered list, link, unlink, insert image, insert video, insert audio, and insert document. Below the toolbar is a large, empty text area for writing answers.

Tick this box

Insert answers to questions here

Dateiabgabe

A file upload interface. At the top, it says 'Maximale Größe für Dateien: 50 MB, maximale Anzahl von Anhängen: 50'. Below this is a dashed rectangular box with a download icon in the center. Below the box, it says 'Bewegen Sie Dateien in dieses Feld (Drag-and-drop)'. To the left of the box is a label 'Dateien' with a folder icon.

Make sure all required files are uploaded correctly

Anderungen speichern

Abbrechen

Google Cloud: Education Grants

- 50\$ coupons received for education purpose
- Follow the instructions on the assignment sheet to receive the credits
- Most newly created accounts receive additional credits valid for one year
- Google Cloud might ask for a credit card, but it will not be charged

Google Cloud and other Platforms

- Pay-as-you-go model:
 - Pay by the hour, megabyte, request, ...
 - Permanent use can be expensive, but many possibilities without much configuration
- Administration possible via:
 - Browser (Management console)
 - Command Line
 - Based on REST API
 - Required to solve the project assignments
 - REST API

Google Cloud

The screenshot shows the Google Cloud Platform console dashboard for a project named 'My First Project'. The interface is divided into a left sidebar, a central main area, and a right-hand navigation pane.

Annotations:

- Billing:** A box pointing to the 'Abrechnung' (Billing) link in the left sidebar.
- Account Management:** A box pointing to the 'IAM & Verwaltung' (IAM & Management) link in the left sidebar.
- Virtual Machines:** A box pointing to the 'Compute Engine' link in the left sidebar.

Main Area Content:

- Projektinformationen:** Displays project details such as 'Projektname: My First Project', 'Projekt-ID: sodium-octane-221715', and 'Projektnummer: 791070547693'.
- Ressourcen:** Shows a list of resources, including 'Compute Engine' with 1 instance.
- Trace:** A section for viewing traces, currently showing 'Keine Tracedaten für die letzten 7 Tage'.
- Erste Schritte:** A list of initial steps for getting started, such as 'APIs aktivieren und Anmeldeinformationen (z. B. Schlüssel) abrufen'.
- CPU (%):** A line graph showing CPU usage over time.
- APIs:** A section for managing APIs, showing 'Anfragen (Anfragen/s)'.

Right-hand Navigation Pane:

- Status der Google Cloud Platform:** Shows 'Alle Dienste normal'.
- Abrechnung:** Displays 'Geschätzte Kosten' for the period '01.11.2018 - 12.11.2018' as '0,00 EUR €'.
- Fehlerberichte:** Shows 'Es wurden keine Fehler festgestellt. Haben Sie Fehlerberichte eingerichtet?'.
- Nachrichten:** A list of news items, including 'Creating asynchronous bot requests in Hangouts Chat' and 'Picture what the cloud can do: How the New York Times is using Google Cloud'.
- Dokumentation:** A link to the documentation.

Regions



Source: <https://cloud.google.com/about/locations?hl=de#lightbox-regions-map>

Command Line Tools

- You will have to set up an environment for connecting to the Cloud APIs
 - Google Cloud CLI: <https://cloud.google.com/sdk/docs>
- Work on Linux (if possible)!
- Read the docs
- Use the CLI tools to create all resources described in the assignment

Last Reminder

Always remember to shut
down your unused VMs!

About the Exam

- Written Exam
 - 1st date: 22.02.2024, 2nd date: 12.04.2024
- Up to 50% (50 points) of the final grade
- Duration: 60 (+10) minutes
- **Primarily focused** on the lecture content!
 - Includes topics from all chapters
 - May occasionally take up assignment-related topics
- Makes use of various examination types:
 - Multiple Choice
 - True / False Statement
 - Free Text (e.g. explain something or answer a question)
 - Smaller Calculation Task

About the Exam

Multiple Choice

Which cloud service model relies on virtual machines to provide servers?

True / False Statement

Replication of data can improve availability of a system.

Free Text

Name all NIST deployment models for cloud computing.

Calculation Task

Show the results of all steps for a case-insensitive wordcount MapReduce program for the following text. Ignore the punctuation marks.